CHAPTER 4

WIND SENSOR

SECTION I. DESCRIPTION AND LEADING PARTICULARS

4.1.1 INTRODUCTION

This Chapter provides field service information for the wind sensor (an updated Model 2000 manufactured by Belfort Equipment Company). This information includes wind sensor physical description, sensor configurations, installation, operation, theory of operation, and preventive and corrective maintenance.

4.1.2 PHYSICAL DESCRIPTION

4.1.2.1 **Introduction**. The wind sensor measures current wind speed and direction relative to true north and computes 5-second averages of these measurements. Wind measurement data are output in response to request signals from the data collection package (DCP). Each response message includes diagnostic status signals generated by the sensor's internal, continuously running self-test.

4.1.2.2 **System Physical Components**. The wind sensor (Figure 4.1.1) consists of four major components: wind speed sensor, wind direction sensor, crossarm support, and wind sensor electronics enclosure. The wind speed sensor is made up of two components: a wind speed transducer and a cup assembly. Similarly, the wind direction sensor consists of a wind direction transducer and a vane assembly. All four of these items are field replaceable units (FRU's). The wind sensor crossarm assembly and electronics enclosure are also FRU's, as well as a processor board and power supply within the electronics enclosure. The wind speed sensor, wind direction sensor, and crossarm support are all mounted on a tipping tower to allow them to operate free from ground obstructions while still being easy to maintain.

The housings of the wind speed and direction sensors are fabricated out of Admiralty brass. The cups and vane are made of corrosion resistant stainless steel. All electrical connections to the sensors are through the crossarm support.

The wind sensor electronics enclosure provides electrical power to the wind sensor and a communications data link between the sensor and the DCP. The electronics enclosure houses the sensor's data processing board, power supply, fiberoptic module, and power input box (rf filter assembly). The wind sensor electronics enclosure is mounted on the sensor tower support.

Wind speed is measured by a rotating three-cup device that drives a photointerrupter device. Wind direction is measured by a direction vane assembly coupled to a precision potentiometer. The outputs from the wind direction and wind speed sensors are processed and converted to an RS-232C message format by a microprocessor module located in the wind sensor electronics enclosure. The RS-232C format is then converted to an optical signal by the fiberoptic module located in the wind sensor electronics enclosure for output to the DCP.

4.1.3 WIND SENSOR CONFIGURATIONS

This Section defines the configurations of the various field replaceable units (FRU's) that make up the wind sensor. All versions of the FRU's making up the wind sensor are interchangeable with one possible exception. Some early model vane and cup assemblies do not fit well on some later model transducer assemblies. (See the concentricity procedure in table 4.5.10.)

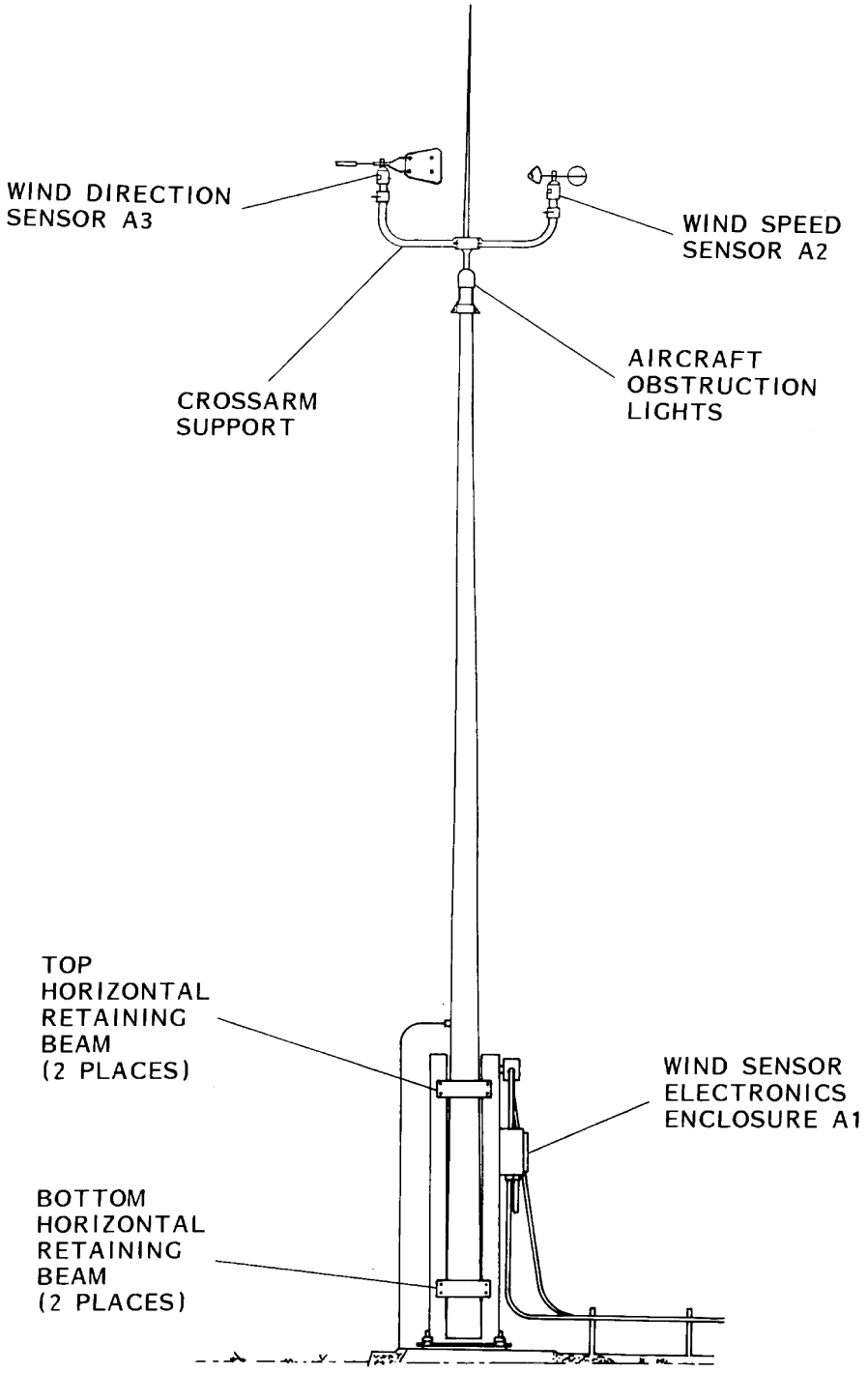

Figure 4.1.1. Wind Sensor Locational Diagram

4.1.3.1 **Wind Speed Sensor**. The wind speed sensor has six possible configurations dependent upon the combination of three versions of wind speed transducers and two versions of wind speed cup assemblies.

4.1.3.1.1 **Wind Speed Transducer**. There are three versions of wind speed transducers; Mod 0, Mod 1, and Mod 2, the latest production configuration.

The Mod 0 wind speed transducer is considered obsolete. It can be identified by the manufacturer's part number 32228 stamped onto the identification plate on the side of the unit. The Mod 0 wind speed transducer is subject to bearing failures, excessive torque, and moisture problems; for these reasons, it is suggested that any remaining Mod 0 units be replaced with Mod 1 or preferably, Mod 2 wind speed transducers upon failure of the unit.

The Mod 1 wind speed transducer can be identified by the manufacturer's part number 32228 MOD 1 stamped onto the identification plate on the side of the unit. The Mod 1 unit corrected the internal problems of the Mod 0 transducer; however, the relatively flat top of the Mod 0 and Mod 1 transducers can allow ice buildup which could degrade the performance of the unit in severe cold weather. For this reason, it is recommended that the Mod 1 wind speed transducer not be used in climates where icing is prevalent.

The Mod 2 wind speed transducer can be identified by the manufacturer's part number 33079 stamped onto the identification plate on the side of the unit and by the unit's steeply sloping top. The Mod 2 wind speed transducer operates well in all climates and is the recommended replacement for any failed wind speed transducer.

4.1.3.1.2 **Wind Speed Cup Assembly**. There are two versions of wind speed cup assemblies; basic and Rev. C.

The basic version of the wind speed cup assembly can be identified by the relatively short (0.125"), steep (45°) rain shield flair. This unit is susceptible to moisture problems during severe weather and should be replaced with the Rev. C version when a failure occurs.

The Rev. C version of the wind speed cup assembly can be identified by the relatively long (0.156"), shallow (20°) rain shield flair. Rev. C is the preferred version of the wind speed cup assembly and should be used whenever possible.

4.1.3.2 **Wind Direction Sensor**. The wind direction sensor has six possible configurations dependent upon the combination of three different versions of wind direction transducers and two different versions of wind direction vane assemblies.

4.1.3.2.1 **Wind Direction Transducer.** There are three versions of wind direction transducers; Mod 0, Mod 1, and Mod 2.

The Mod 0 wind direction transducer can be identified by the manufacturer's part number 32229 stamped onto the identification plate on the side of the unit. The Mod 0 wind direction transducer is subject to bearing failures, excessive torque, and moisture problems; for these reasons it is suggested that any remaining Mod 0 units be replaced with Mod 1 or preferably the Mod 2 wind direction transducers upon failure of the unit.

The Mod 1 wind direction transducer can be identified by the manufacturer's part number 32229 MOD 1 stamped onto the identification plate on the side of the unit. The Mod 1 unit corrected the internal problems of the Mod 0 transducer; however, the relatively flat top allows ice to build up and degrade the performance of the unit in severe weather. For this reason, it is recommended that the Mod 1 wind direction transducer not be used in climates where icing is prevalent.

Mod 2 of the wind direction transducer can be identified by the manufacturer's part number 33080 stamped onto the identification plate on the side of the unit and by the unit's steeply sloping top. The current configuration wind direction transducer operates well in all climates and is the recommended replacement for any failed wind direction transducer.

4.1.3.2.2 **Wind Direction Vane Assembly**. There are two versions of the wind direction vane assembly; basic and Rev. C.

The basic version of the wind direction vane assembly can be identified by the relatively short (0.125"), steep (45°) rain shield flair. This unit is susceptible to moisture problems during severe weather and should be replaced with the Rev. C version when a failure occurs.

The Rev. C version of the wind direction vane assembly can be identified by the relatively long (0.156"), shallow (20°) rain shield flair. Rev. C is the preferred version of the wind direction vane assembly and should be used whenever possible.

4.1.3.3 **Crossarm Assembly**. There are three versions of crossarm assemblies; basic, Rev. F, and Rev. G.

The basic version of the crossarm assembly can be identified by the front opening condulet and the aluminum adapters at the crossarm ends (sensor must be removed to view adapter). The aluminum adapters are subject to corrosion and the crossarms are subject to cracking at or near the condulet if mishandled. (Example: Releasing the tipping tower suddenly and allowing the sensors to attain a high rate of acceleration prior to being stopped could damage the crossarm assembly. It is best to control the tower's progress during the righting process with the rope installed for that purpose.) It is suggested that the crossarm assembly be replaced with the Rev. G version if the basic version is damaged or badly corroded.

The Rev. F version of the crossarm assembly can be identified by the front opening condulet and the brass adapters at the crossarm ends (sensor must be removed to view adapter). The brass adapters were added to reduce corrosion. The crossarms are subject to cracking at or near the condulet if mishandled. (Example: Releasing the tipping tower suddenly and allowing the sensors to attain a high rate of acceleration prior to being stopped could damage the crossarm assembly. It is best to control the tower's progress during the righting process with the rope installed for that purpose.) It is suggested that the crossarm assembly be replaced with the Rev. G version if the Rev. F version is damaged.

The Rev. G version of the crossarm assembly can be identified by the top opening on the condulet (the condulets on the other versions open on the side). The Rev. G crossarm has been built stronger to prevent damage caused by acceleration. This crossarm is the preferred version and is recommended as the replacement for failed units.

4.1.3.4 **Wind Sensor Electronics Enclosure**. There are two different versions of wind sensor electronics enclosures; basic and Rev. J.

The basic version of the wind sensor electronics enclosure can be identified by the two line filters present on the side of the Faraday box, inside the enclosure.

The Rev. J version of the wind sensor electronics enclosure can be identified by the single line filter present on the side of the Faraday box, inside the enclosure. The other line filter was removed to reduce system complexity.